PATENT

Docket No. SJO920030089US1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant: Anthony S. Pearson et al.
Serial No.:   10/790,609
Filed: March 1, 2004
For: **APPARATUS, SYSTEM, AND METHOD FOR MANAGING MULTIPLE COPY VERSIONS**
Examiner: Binh V. Ho

Group Art
Unit: 2163

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Examiner:

The USPTO received Appellant's timely Notice of Appeal on June 6, 2007, which was filed in response to the Final Office Action mailed March 6, 2007 and the Advisory Action mailed May 30, 2007. Appellant appeals the rejection of pending claims 1, 11, 17, 20, 30, 31, 32.

This Brief is being filed under the provisions of 37 C.F.R. § 41.37. This Brief is timely as the Brief is being filed within two months of the filing of the notice of appeal. The filing fee set forth in 37 C.F.R. § 41.20(b)(2) of $500.00 is submitted herewith. The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication, or to credit any overpayment, to Deposit Account No. 09-0466.

1. REAL PARTY IN INTEREST

The real party in interest is the assignee, International Business Machines Corporation.

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals, interferences, or judicial proceedings.

3. STATUS OF CLAIMS

The Office Action cites the following art: United States Patent Number 6,978,282 to Dings (hereinafter Dings) and United States Patent Number 6,959,369 to Ashton (hereinafter Ashton).

Claims 1, 5-20, and 24-32 are pending in the case. Claims 2-4 and 21-23 are canceled. Claims 1, 11, 17, 20, 30, 31, 32 are independent claims. Claims 1, 5-12, 14, 16-20, and 24-32 are rejected under 35 USC § 102(e) as anticipated by Dings. Claims 13 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dings in view of Ashton.

4. STATUS OF AMENDMENTS

No proposed amendments are pending.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter deals with managing multiple copy versions of a source volume. See published version of the application US patent Publication No. 2005/0193038 (hereinafter '038) page 1, ¶ 10, lines 5-9.

The problem addressed is managing pre-pairing records. See '038 ¶ 12, lines 4-7. Pre-pairing records pair a source volume with a target volume before a copy or backup operation so that copy pairing does not use source computer processing time. See '038, page 1, ¶ 6, lines 3-11. The present invention improves pre-pairing by creating a copy record that specifies copy pairs used to copy source volume data to target volumes. See '038 page 1, ¶ 6, lines 3-5'; page 1, ¶ 12, lines 7-10. Specifically, the claimed invention provides that the copy record specifies copy pairs from either a current replication record or a future pairing record. See '038 page 1, ¶

12, lines 7-10. The claimed invention further compares a new replication record to the current replication record and breaks a copy pair for a removed source volume present in the current replication record, but not present in the new replication record '038 page 8, ¶ 101, lines 1-7.

Claim 1 presents an apparatus for managing multiple copy versions of a source volume. The apparatus comprises a replication record management module that maintains a current replication record descriptive of a current copy version of a source volume ('038 page 1, ¶ 12, lines 1-4; fig. 3, ref. 332). In addition, a pre-pairing record management module maintains a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322). The apparatus also comprises a copy record module that creates a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 3, ref. 334; fig. 7). In addition, a replication module ('038 page 7, ¶ 86, lines 3-9; fig. 3, ref. 324) replicates the source volume on a target volume, creates a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6), and establishes a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9). The replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 1-7; fig. 3, ref. 332).

The following quotation of claim 1 includes reference numerals and parenthetical references to representative examples of the elements and components recited in claim 1 in compliance with 37 CFR 41.37(c)(1)(v).

1. An apparatus for managing multiple copy versions of a source volume, the apparatus comprising:

a replication record management module configured to maintain a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4; fig. 3, ref. 332);

a pre-pairing record management module configured to maintain a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322);

a copy record module configured to create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 3, ref. 334; fig. 7);

a replication module ('038 page 7, ¶ 86, lines 3-9; fig. 3, ref. 324) configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6), and establish a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9); and

the replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 1-7; fig. 3, ref. 332).

Claim 11 presents an apparatus for managing multiple copy versions of a source volume. The apparatus includes a replication record management module that maintains a plurality of replication records, each replication record descriptive of a copy version of a source volume ('038 page 1,¶ 12, lines 1-4; fig. 3, ref. 332). In addition, the apparatus includes a pre-pairing record management module that maintains a plurality of pre-pairing records, each pre-pairing record descriptive of a copy version of the source volume ('038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322). The apparatus also comprises a copy record module that creates a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 3, ref. 334; fig. 7). In addition, the apparatus includes a replication module ('038 page 7, ¶ 86, lines 3-9; fig. 3, ref. 324) that replicates the source volume on a target volume, creates a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6), and establishes a new replication record descriptive of the new copy version of the source

volume ('038, page 8, ¶ 99, lines 6-9). The replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 1-7; fig. 3, ref. 332). The apparatus also includes a record management module that dynamically manages the plurality of replication records and pre-pairing records in response to a change in the data copy environment ('038 page 7, ¶ 87, lines 1-9; fig. 3, ref. 328).

The following quotation of claim 11 includes reference numerals and parenthetical references to representative examples of the elements and components recited in claim 11 in compliance with 37 CFR 41.37(c)(1)(v).

11. An apparatus for managing multiple copy versions of a source volume, the apparatus comprising:

a replication record management module configured to maintain a plurality of replication records, each replication record descriptive of a copy version of a source volume ('038 page 1,¶ 12, lines 1-4; fig. 3, ref. 332);

a pre-pairing record management module configured to maintain a plurality of pre-pairing records, each pre-pairing record descriptive of a copy version of the source volume ('038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322);

a copy record module configured to create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 3, ref. 334; fig. 7);

a replication module ('038 page 7, ¶ 86, lines 3-9; fig. 3, ref. 324) configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6), and establish a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9);

the replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 1-7; fig. 3, ref. 332); and

a record management module configured to dynamically manage the plurality of replication records and pre-pairing records in response to a change in the data copy environment ('038 page 7, ¶ 87, lines 1-9; fig. 3, ref. 328).

Claim 17 presents a system for managing multiple copy versions of a source volume. The system includes a storage subsystem configured to store backup data ('038, page 3, ¶ 42, lines 1-4; fig. 1, ref. 108) and a backup manager configured to direct the storage subsystem to create a plurality of copy versions from a plurality of source volumes and to store backup information descriptive of each of the plurality of copy versions ('038, page 3, ¶ 44, lines 1-8; fig. 1, ref. 106). In addition, the system includes a backup management apparatus configured to manage the plurality of copy versions and the backup information descriptive of each of the plurality of copy versions ('038, page 7, ¶ 85, lines 1-3; fig. 3, ref. 308). The system also includes a replication record management module configured to maintain a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4; fig. 3, ref. 332).

The system further includes a pre-pairing record management module configured to maintain a future pre-pairing record descriptive of a future copy version of the source volume and a copy record module configured to create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322). In addition, the system includes a replication module ('038 page 7, ¶ 86, lines 3-9; fig. 3, ref. 324) configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6), and establish a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9). The replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 1-7; fig. 3, ref. 332).

The following quotation of claim 17 includes reference numerals and parenthetical references to representative examples of the elements and components recited in claim 17 in compliance with 37 CFR 41.37(c)(1)(v).

17. A system for managing multiple copy versions of a source volume, the system comprising:

a storage subsystem configured to store backup data ('038, page 3, ¶ 42, lines 1-4; fig. 1, ref. 108);

a backup manager configured to direct the storage subsystem to create a plurality of copy versions from a plurality of source volumes and to store backup information descriptive of each of the plurality of copy versions ('038, page 3, ¶ 44, lines 1-8; fig. 1, ref. 106);

a backup management apparatus configured to manage the plurality of copy versions and the backup information descriptive of each of the plurality of copy versions ('038, page 7, ¶ 85, lines 1-3; fig. 3, ref. 308);

a replication record management module configured to maintain a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4; fig. 3, ref. 332);

a pre-pairing record management module configured to maintain a future pre-pairing record descriptive of a future copy version of the source volume; and

a copy record module configured to create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322);

a replication module ('038 page 7, ¶ 86, lines 3-9; fig. 3, ref. 324) configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6), and establish a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9); and

the replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 1-7; fig. 3, ref. 332).

Claim 20 presents a computer readable storage medium comprising computer readable code. The computer readable code carries out a method comprising maintaining a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4). The method further includes maintaining a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7). In addition, the method includes creating a copy record from a pre-copy record, the pre-copy record comprising one of

the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 7). The method also includes replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6). In addition, the method includes establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9). The method also includes comparing the new replication record to the current replication record ('038 page 8, ¶ 101, lines 1-4). In addition, the method includes breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 4-7).

The following quotation of claim 20 includes reference numerals and parenthetical references to representative examples of the elements and components recited in claim 20 in compliance with 37 CFR 41.37(c)(1)(v).

20. A computer readable storage medium comprising computer readable code configured to carry out a method for managing multiple copy versions of a source volume, the method comprising:

maintaining a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4);

maintaining a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7);

creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 7);

replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6);

establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9);

comparing the new replication record to the current replication record ('038 page 8, ¶ 101, lines 1-4); and

breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 4-7).

Claim 30 presents a method for managing multiple copy versions of a source volume. The method includes maintaining a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4). In addition, the method includes maintaining a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7). The method also includes creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 7). In addition, the method includes replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6). The method further includes establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9). In addition, the method includes comparing the new replication record to the current replication record ('038 page 8, ¶ 101, lines 1-4). The method further includes breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 4-7).

The following quotation of claim 30 includes reference numerals and parenthetical references to representative examples of the elements and components recited in claim 30 in compliance with 37 CFR 41.37(c)(1)(v).

30. A method for managing multiple copy versions of a source volume, the method comprising:
maintaining a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4);
maintaining a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7);
creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 7);
replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6);

establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9);

comparing the new replication record to the current replication record ('038 page 8, ¶ 101, lines 1-4); and

breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 4-7).

Claim 31 presents a method for managing multiple copy versions of a source volume. The method includes maintaining a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4). In addition, the method includes maintaining a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7). The method further includes creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 7). The method also includes replicating the source volume on a target volume and create a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6). In addition, the method includes establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9). The method also includes maintaining a replication record descriptive of a previous copy version.

The method further includes verifying the pre-copy record, accounting for a change in one of a source pool and a target pool ('038, page 8, ¶ 103, lines 4-6; fig. 7, refs. 704, 706). In addition, the method includes replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6; page 9, ¶ 107, lines 4-14). The method further includes establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9). The method also includes comparing the new replication record to the current replication record ('038 page 8, ¶ 101, lines 1-4). In addition, the method includes breaking a copy pair for a removed

source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 4-7).

The following quotation of claim 31 includes reference numerals and parenthetical references to representative examples of the elements and components recited in claim 31 in compliance with 37 CFR 41.37(c)(1)(v).

31. A method for managing multiple copy versions of a source volume, the method comprising:
maintaining a current replication record descriptive of a current copy version of a source volume ('038 page 1,¶ 12, lines 1-4);
maintaining a future pre-pairing record descriptive of a future copy version of the source volume ('038 page 1, ¶ 12, lines 4-7);
creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record ('038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 7);
replicating the source volume on a target volume and create a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6);
establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9);
maintaining a replication record descriptive of a previous copy version;
verifying the pre-copy record, accounting for a change in one of a source pool and a target pool ('038, page 8, ¶ 103, lines 4-6; fig. 7, refs. 704, 706);
replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record ('038, page 8, ¶ 99, lines 1-6; page 9, ¶ 107, lines 4-14);
establishing a new replication record descriptive of the new copy version of the source volume ('038, page 8, ¶ 99, lines 6-9);
comparing the new replication record to the current replication record ('038 page 8, ¶ 101, lines 1-4); and
breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record ('038 page 8, ¶ 101, lines 4-7).

Claim 32 presents an apparatus for managing multiple copy versions of a source volume. The apparatus includes means for maintaining a current replication record descriptive of a current copy version of a source volume (replication record management module, '038 page 1,¶ 12, lines 1-4; fig. 3, ref. 332). In addition, the apparatus includes means for maintaining a future

pre-pairing record descriptive of a future copy version of the source volume (pre-pairing record management module, '038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322). The apparatus further includes means for creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record (copy record module, '038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 3, ref. 334; fig. 7). In addition, the apparatus includes replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record (replication module, '038, page 7, ¶ 86, lines 3-9; page 8, ¶ 99, lines 1-6; fig. 3, ref. 324), establishing a new replication record descriptive of the new copy version of the source volume (replication module, '038, page 8, ¶ 99, lines 6-9, fig. 3, ref. 324), comparing the new replication record to the current replication record (replication record management module, '038 page 8, ¶ 101, lines 1-4; fig. 3, ref. 332), and breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record (replication record management module, '038 page 8, ¶ 101, lines 4-7; fig. 3, ref. 332).

The following quotation of claim 32 includes reference numerals and parenthetical references to representative examples of the elements and components recited in claim 32 in compliance with 37 CFR 41.37(c)(1)(v).

32. An apparatus for managing multiple copy versions of a source volume, the apparatus comprising:
      means for maintaining a current replication record descriptive of a current copy version of a source volume (replication record management module, '038 page 1,¶ 12, lines 1-4; fig. 3, ref. 332);
      means for maintaining a future pre-pairing record descriptive of a future copy version of the source volume (pre-pairing record management module, '038 page 1, ¶ 12, lines 4-7; fig. 3, ref. 322);
      means for creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record (copy record module, '038 page 1, ¶ 12, lines 7-10; page 8, ¶ 103, line 1 – page 9, ¶ 105, line 12; fig. 3, ref. 334; fig. 7);

replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record (replication module, '038, page 7, ¶ 86, lines 3-9; page 8, ¶ 99, lines 1-6; fig. 3, ref. 324);

establishing a new replication record descriptive of the new copy version of the source volume (replication module, '038, page 8, ¶ 99, lines 6-9, fig. 3, ref. 324);

comparing the new replication record to the current replication record (replication record management module, '038 page 8, ¶ 101, lines 1-4; fig. 3, ref. 332); and

breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record (replication record management module, '038 page 8, ¶ 101, lines 4-7; fig. 3, ref. 332).

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

    I. Whether the Examiner properly rejected claims 1, 11, 17, 20, 30, 31, and 32 under 35 U.S.C. §102(e) as anticipated by Dings?

7. ARGUMENT

I. The rejection of claims 1, 11, 17, 20, 30, 31, and 32 under 35 U.S.C. §102(e) as anticipated by Dings is improper because Dings fails to teach each element of the recited claims.

Summary of the Examiner arguments.

[001]   The Examiner rejects claims 1, 11, 17, 20, 30, 31, and 32 under 35 U.S.C. § 102(e) as being anticipated by Dings. The Examiner relies on Dings for the teaching of "…comparing the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record…" and creating "…a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record…" Advisory Action of May 30, 2007, page 2, lines 2-3, 7-8. In the Final Office Action of March 6, 2007 and Advisory Action of May 30, 2007, the Examiner indicates that the Appellants' arguments are unpersuasive. The Examiner then responds to the Appellants' arguments.

Response.

[002]   Appellants respectfully reaffirm the arguments raised against the rejection of claims 1, 11, 17, 20, 30, 31, and 32 under 35 USC §102(e) set forth in the response of May 7, 2007. Specifically, Appellants submit that Dings does not teach all of the elements of the present invention including the elements of creating "…a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record…" and "…compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record." See '038, claim 1.

The legal requirements

[003]   "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v.*

Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987). For a *prima facie* case of anticipation, each and every element of the claimed invention must be identically disclosed in a single prior art reference; and those elements must be arranged or connected together in a single reference in the same way as specified in the patent claim. *Lindemenn Maschinenfabrik GmbH vs. American Hoist and Derick Co.,* 730 F2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984).

Claim 1

Claim 1 recites:

1. An apparatus for managing multiple copy versions of a source volume, the apparatus comprising:

a replication record management module configured to maintain a current replication record descriptive of a current copy version of a source volume;

a pre-pairing record management module configured to maintain a future pre-pairing record descriptive of a future copy version of the source volume;

a copy record module configured to **create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record**;

a replication module configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record, and establish a new replication record descriptive of the new copy version of the source volume; and

the replication record management module is further configured to **compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record**.

[004]   Appellants maintain the position that Dings does not teach or disclose each element of claim 1. Claim 1 is representative of the other rejected independent claims 11, 17, 20, 30, 31, and 32. Claim 1 includes the elements of creating "…a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record…" and "…compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record." See '038, claim 1. Appellant submits that Dings does not disclose these elements.

[005]   In the Advisory Action of May 30, 2007, the Examiner cites Dings as teaching creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record. Advisory Action of May 30, 2007, page 2, lines 7-9. No reference to Dings is cited for this teaching in the Advisory Action. However, the Final Office Action of March 6, 2007 cites a number of references to Dings for the limitations of claim 1. See Final Office Action of March 6, 2007, page 3, lines 5-7.

[006]   Appellants have reviewed each these teachings, including the teachings of a query screen (Dings, col. 7, lines 18-29), unmounting the Business Continuation Volume (BCV) (Dings, col. 7, lines 61-64), BCVs and standard volumes (Dings, col. 9, lines 57+), backups from the standard volume to the BCV (Dings, col. 11, lines 5-20), Redo log files and restoring the source volume (Dings col. 12, lines 2-58), restore roll forwards (Dings, col. 14, lines 6-17), partial database mounting replication (Dings, col. 14, lines 53+, mapping files (Dings, col. 15, lines 10-17), creating the database server, (Dings, col. 15, lines 40-45), comparing a partial tree file to an original tree (Dings, col. 15, lines 59+), calculating pair scores (Dings, col. 18, lines 1+), and ranking using pair scores (Dings, col. 19, lines 1+). Appellants assume that the Examiner is referring to the teaching of comparing a partial tree file to an original tree as the disclosure of creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record in Dings.

[007]   Appellants submit that Dings' teaching of comparing a partial tree file to an original tree is not equivalent to creating a copy record from a pre-copy record, the pre-copy

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record comprising one of the current replication record and the future pre-pairing record. Dings teaches comparing the partial tree tile to the original tree as part of a partial database replication. See Dings, col. 15, lines 34-38. The partial tree is selected from entries the original tree. See Dings, col. 15, lines 59-60. Thus the comparison is not to determine differences in the entries of the partial tree file and the original tree, but only to determine the tablespaces that do not need to be recovered as the partial tree file entries are not modified from the original tree values, only a partial set. See Dings, col. 15, lines 62-64.

[008]   Dings does not teach **creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record**. Applicants therefore submit that Dings does not teach all of the elements of claim 1.

[009]   In the Advisory Action of May 30, 2007, the Examiner cites Dings as disclosing comparing the new replication record to the current replication record. Advisory Action of May 30, 2007, page 2, lines 10-12. The Examiner cites Dings teaching of standard/Business Continuation Volume (BCV) pairs, which are analogous to source/target pairs in the present invention. Dings, col. 3, lines 45-67; col. 4, lines 1-20. The Examiner further cites Dings disclosure calculating pair scores for source and target pairs. Dings, col. 18, lines 1-10; col. 19, lines 52-67. Appellants assert that these teachings in Dings are differentiated from comparing the new replication record to the current replication record as claimed in claim 1.

[010]   Dings determines standard volume/BCV pairs by calculating pair scores for different pairs of standard volumes and BCVs. Dings, col. 18, lines 1-20. Appellants submit that the elements taught by Dings clearly differentiated from comparing the new replication record to the current replication record as claimed by the present invention. The comparison in Dings is between standard volume/BCV pairs. Dings, col. 19, lines 52-67. The present invention claims comparing a new replication record to a current replication record. '038, claim 1. The new replication record and current replication record are for different copy versions of a source volume. See '038, page 1, ¶ 12, lines 1-4; page 2, ¶ 19, lines 1-9. Because the comparison of the new replication record to the current replication record is not equivalent to a comparison of standard volumes and BCV, Appellants submit that Dings does not teach each element of claim 1.

[011]   In the Advisory Action of May 30, 2007, the Examiner cites Dings as disclosing breaking a copy pair. Advisory Action of May 30, 2007, page 2, lines 13-14. Specifically, the Examiner cites Dings teaching of cleanup and dismounting a BCV. See Dings, col. 12, lines 20-26; col. 11, lines 5-9; fig. 13, ref. 1100. However, Appellants submit that Dings does not teach breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record as claimed in claim 1. The disclosure in Dings is limited to dismounting a BCV and does not include the element of **breaking a copy pair** *for a removed source volume present in the current replication record, but not present in the new replication record*.

[012]   Because Dings does not disclose all of the elements of claim 1, Appellants assert that claim 1 is allowable. Claims 11, 17, 20, 30, 31, and 32 include the missing elements of creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record and breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record discussed above in relation to claim 1. Therefore, claims 11, 17, 20, 30, 31, and 32 are allowable for at least the same reasons as claim 1.

[013]   Claims 5-10, 12-16, 18, 19, and 24-29 depend from claims 1, 11, 17, 20, 30, 31, and 32 and are allowable for at least the same reasons as the independent claims.

SUMMARY

In view of the foregoing, Appellants respectfully assert that each of the claims on appeal has been improperly rejected because the rejections under 35 U.S.C. §102(e) are improper. Therefore, Appellants respectfully request reversal of the Examiner's rejections under 35 U.S.C. §102(e), and urges that pending claims 1, 5-20, and 24-32 are ready for prompt allowance. Appellants appeal to the Board's objective and reasoned decision on this matter.

Respectfully submitted,

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8. CLAIMS APPENDIX

The claims involved in the appeal, namely Claims 1, 5-20, and 24-32, are listed below.

1. An apparatus for managing multiple copy versions of a source volume, the apparatus comprising:

   a replication record management module configured to maintain a current replication record descriptive of a current copy version of a source volume;

   a pre-pairing record management module configured to maintain a future pre-pairing record descriptive of a future copy version of the source volume;

   a copy record module configured to create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record;

   a replication module configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record, and establish a new replication record descriptive of the new copy version of the source volume; and

   the replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record.

5. The apparatus of claim 1, wherein the replication record management module is further configured to maintain a previous replication record descriptive of a previous copy version.

6. The apparatus of claim 1, wherein the pre-pairing record management module is further configured to maintain a previous pre-pairing record descriptive of a previous copy version.

7. The apparatus of claim 1, further comprising a pre-pairing module configured to create the future pre-pairing record.

8. The apparatus of claim 1, further comprising a target selection module configured to locate a target volume available for use to create a copy version of the source volume.

9. The apparatus of claim 1, wherein the copy record module is further configured to verify the future pre-pairing record and to account for a change in one of a source pool and a target pool.

10. The apparatus of claim 1, wherein the copy record module is further configured to verify the current replication record and to account for a change in one of a source pool and a target pool.

11. An apparatus for managing multiple copy versions of a source volume, the apparatus comprising:

a replication record management module configured to maintain a plurality of replication records, each replication record descriptive of a copy version of a source volume;

a pre-pairing record management module configured to maintain a plurality of pre-pairing records, each pre-pairing record descriptive of a copy version of the source volume;

a copy record module configured to create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record;

a replication module configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record, and establish a new replication record descriptive of the new copy version of the source volume;

the replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record; and

a record management module configured to dynamically manage the plurality of replication records and pre-pairing records in response to a change in the data copy environment.

12. The apparatus of claim 11, wherein the change in the data copy environment comprises an addition of a source volume to a source pool.

13. The apparatus of claim 11, wherein the change in the data copy environment comprises a removal of a source volume from a source pool.

14. The apparatus of claim 11, wherein the change in the data copy environment comprises an addition of a target volume from a target pool.

15. The apparatus of claim 11, wherein the change in the data copy environment comprises a removal of a target volume from a target pool.

16. The apparatus of claim 11, wherein dynamically managing the plurality of replication records comprises verifying the current status of a volume in the data copy environment and updating a replication record in response to a change from a previous status of the volume.

17. A system for managing multiple copy versions of a source volume, the system comprising:

a storage subsystem configured to store backup data;

a backup manager configured to direct the storage subsystem to create a plurality of copy versions from a plurality of source volumes and to store backup information descriptive of each of the plurality of copy versions;

a backup management apparatus configured to manage the plurality of copy versions and the backup information descriptive of each of the plurality of copy versions;

a replication record management module configured to maintain a current replication record descriptive of a current copy version of a source volume;

a pre-pairing record management module configured to maintain a future pre-pairing record descriptive of a future copy version of the source volume; and

a copy record module configured to create a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record;

a replication module configured to replicate the source volume on a target volume, create a new copy version of the source volume according to the copy record, and

establish a new replication record descriptive of the new copy version of the source volume; and

the replication record management module is further configured to compare the new replication record to the current replication record and to break a copy pair for a removed source volume present in the current replication record, but not present in the new replication record.

18. The system of claim 17, wherein the backup manager further comprises a backup information module configured to store the backup information, the backup information comprising a replication record, a volume inventory, a copy pool inventory, and a dataset inventory.

19. The system of claim 17, wherein the backup manager further comprises a backup information module configured to store the backup information, the backup information comprising pre-pair record descriptive of a future copy version of one of the source volumes.

20. A computer readable storage medium comprising computer readable code configured to carry out a method for managing multiple copy versions of a source volume, the method comprising:

maintaining a current replication record descriptive of a current copy version of a source volume;

maintaining a future pre-pairing record descriptive of a future copy version of the source volume;

creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record;

replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record;

establishing a new replication record descriptive of the new copy version of the source volume;

comparing the new replication record to the current replication record; and

breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record.

24. The computer readable storage medium of claim 20, wherein the method further comprises maintaining a previous replication record descriptive of a previous copy version.

25. The computer readable storage medium of claim 20, wherein the method further comprises maintaining a previous pre-pairing record descriptive of a previous copy version.

26. The computer readable storage medium of claim 20, wherein the method further comprises creating the future pre-pairing record.

27. The computer readable storage medium of claim 20, wherein the method further comprises locating a target volume available for use to create a copy version of the source volume.

28. The computer readable storage medium of claim 20, wherein the method further comprises verifying the future pre-pairing record, accounting for a change in one of a source pool and a target pool.

29. The computer readable storage medium of claim 20, wherein the method further comprises verifying the current replication record, accounting for a change in one of a source pool and a target pool.

30. A method for managing multiple copy versions of a source volume, the method comprising:
maintaining a current replication record descriptive of a current copy version of a source volume;
maintaining a future pre-pairing record descriptive of a future copy version of the source volume; and
creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record;

replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record;

establishing a new replication record descriptive of the new copy version of the source volume;

comparing the new replication record to the current replication record; and

breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record.

31. A method for managing multiple copy versions of a source volume, the method comprising:

maintaining a current replication record descriptive of a current copy version of a source volume;

maintaining a future pre-pairing record descriptive of a future copy version of the source volume;

creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record;

replicating the source volume on a target volume and create a new copy version of the source volume according to the copy record;

establishing a new replication record descriptive of the new copy version of the source volume;

maintaining a replication record descriptive of a previous copy version;

verifying the pre-copy record, accounting for a change in one of a source pool and a target pool;

replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record;

establishing a new replication record descriptive of the new copy version of the source volume;

comparing the new replication record to the current replication record; and

breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record.

32.   An apparatus for managing multiple copy versions of a source volume, the apparatus comprising:

means for maintaining a current replication record descriptive of a current copy version of a source volume;

means for maintaining a future pre-pairing record descriptive of a future copy version of the source volume;

means for creating a copy record from a pre-copy record, the pre-copy record comprising one of the current replication record and the future pre-pairing record;

replicating the source volume on a target volume, creating a new copy version of the source volume according to the copy record;

establishing a new replication record descriptive of the new copy version of the source volume;

comparing the new replication record to the current replication record; and

breaking a copy pair for a removed source volume present in the current replication record, but not present in the new replication record.

9. EVIDENCE APPENDIX

There is no material to be included in the Evidence Appendix.

10. RELATED PROCEEDINGS APPENDIX

There is no material to be included in the Related Proceedings Appendix.